Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (original) A dual bridge matrix converter comprising:

(a) a high DC link line and a low DC link line;

(b) a line-side converter having three input lines connectable to a three-phase AC power system to receive AC power therefrom and connected to the DC link high and low lines to provide unidirectional power thereto, the line-side converter including three gate controlled switching devices, each gate controlled switching device connected from each side thereof by anti-parallel oriented diodes to one of the input lines and each switching device connected by a diode to the DC link high line and by a diode to the DC link low line;

(c) a load-side converter connected to receive power from the DC link lines and having three output lines on which three-phase power is provided, the load-side converter comprising gate controlled switching devices connected in a bridge configuration with pairs of the switching devices connected between the DC link high line and low line and with junctions between the pairs of switching devices connected to the output lines;

(d) a controller connectable to receive the AC voltages provided to the line-side converter and providing control signals to switch the switching devices of the line-side converter and the load-side converter with pulse width modulated control for AC output voltages on the output lines of the load-side converter; and

(e) a clamp circuit connected between the DC link high line and the DC link low line, the clamp circuit including a series connected diode and capacitor with the diode arranged to conduct current from the high DC link line to the low DC link line.

2. (original) The converter of Claim 1 wherein the clamp circuit further includes a gate controlled switch connected in parallel with the clamp diode.

3. (original) The converter of Claim 2 wherein the gate controlled switch connected in parallel with the clamp diode is an IGBT connected so as to conduct when turned on in anti-parallel to the clamp diode.

4. (original) The converter of Claim 2 wherein the controller provides gate control signals to a gate of the switch connected in parallel with the clamp diode to turn the switch on to conduct when the voltage across the clamp capacitor is above a threshold voltage that is greater than the normal peak-to-peak voltage across the input lines and to turn off the switch to a non-conducting state when the voltage across the clamp capacitor is lower than the threshold voltage.

5. (original) The converter of Claim 1 further including an input filter connected between the AC power system and the input lines of the line-side converter, the input filter comprising series connected inductors and parallel connected capacitors.

6. (original) A converter comprising:

(a) a DC link high line and a DC link low line;

(b) a line-side converter having input lines connectable to an AC power system to receive AC power therefrom and connected to the DC link lines to provide unidirectional power thereto, the line-side converter including multiple gate controlled switching devices and diodes connected between the input lines and the DC link high and low lines to provide controlled unidirectional power from the input lines to the DC link lines;

(c) a load-side converter connected to receive power from the DC link lines and having output lines on which AC power is provided, the load-side converter comprising multiple gate controlled switching devices connected in a bridge configuration between the DC link lines and the output lines and controllable to provide AC power on the output lines;

(d) a clamp circuit connected between the DC link high line and the DC link low line, the clamp circuit including a series connected diode and capacitor with the diode arranged to conduct current from the DC link high line to the DC link low line and to block current in the other direction, and a gate controllable clamp switch connected in parallel with the clamp diode; and

(e) a controller providing a control signal to the clamp switch to turn the clamp switch on to conduct current from the clamp capacitor to the DC link high line when the voltage across the clamp capacitor is above a threshold voltage that is greater than the

normal peak-to-peak voltage across the input lines and to turn off the clamp switch when the voltage across the clamp capacitor is lower than the threshold voltage.

7. (original) The converter of Claim 6 further including a controller connectable to receive the AC voltages provided to the line-side converter and providing control signals to switch the switching devices of the line-side converter and the load-side converter with pulse width modulated control for AC output voltages on the output lines of the load-side converter.

8. (original) The converter of Claim 7 wherein the controller that provides control signals to the switching devices of the line-side converter and the load-side converter also comprises the controller that provides control signals to the gate of the clamp switch.

9. (original) The converter of Claim 6 wherein the gate controlled switch connected in parallel with the clamp diode comprises an IGBT connected to conduct current when turned on in a direction anti-parallel to the direction of conduction of the clamp diode.

10. (original) The converter of Claim 6 wherein the line-side converter has three input lines to receive three-phase AC power from a three-phase AC power system, and wherein the load-side converter has three output lines to provide three-phase AC power.

11. (original) A method of controlling a dual bridge matrix converter of the type having a DC link high line and a DC link low line, an input-side converter connected to receive AC input power and connected to provide unidirectional power to the DC link lines and having controllable switching devices to control the unidirectional power supplied to the DC link lines, and a load-side converter connected to the DC link lines to receive power therefrom and having output lines on which AC output power is provided, the method comprising:

(a) providing a clamp circuit across the DC link lines having a series connected diode and a capacitor, and a controllable switch connected in parallel with the clamp diode;

(b) when the voltage across the clamp capacitor is above a threshold that is higher than a normal peak-to-peak AC input voltage, turning on the clamp switch to discharge the clamp capacitor and conduct current through the switch to the load-side converter; and

(c) when the voltage across the clamp capacitor is below the threshold voltage, turning off the clamp switch and maintaining the clamp switch off as long as the voltage across the clamp capacitor is less than the threshold voltage.